AEROPLANE

DATABASE

Avro Lancaster Mk II

16 IN-DEPTH PAGES

Hercules-powered heavy

Scale three-view drawings and profiles

8,000hp at your fingertips

MAIN PICTURE: Avro Lancaster Mk II, DS689 of 426 (Thunderbird) Squadron (RCAF) based at Linton-on-Ouse captured during a visit to the station by photographers and journalists from *Aeroplane* magazine. The bomber was lost during an operation to Stuttgart on October 7/8, 1943; only two of the crew survived, but both evaded captivity FLIGHT/AEROPLANE (KEY ARCHIVE)

AEROPLANE examines the...

Avro Lancaster Mk II

The Merlin under threat

ABOVE: The one and only prototype Mk II, DT810 during trials at Boscombe Down and after it was converted with the type's trademark bulged bomb bay doors. AUTHOR'S COLLECTION

At a time when Britain's production of the Rolls-Royce Merlin engine was seen as most vulnerable to aerial bombing, an alternative powerplant, in the shape of the Bristol Hercules, was installed in the RAF's latest four-engined 'heavy', the Avro Lancaster. **Martyn Chorlton** presents the story of the Lancaster Mk II

When the full potential of the Lancaster was suddenly realised, the colossal numbers of bombers ordered by the Air Ministry initially overwhelmed Avro and to cope with the demand a 'Lancaster Group' was formed. This group, which was made up of Avro, Armstrong Whitworth, Austin Motors, Metropolitan-Vickers and Vickers would take on the task of supplying the RAF with one of the world's greatest bombers and by the end of production, 7,377 had been built. Of this number, Armstrong Whitworth contributed 1,328, of which just 300 were the rare Hercules-powered Mk II. The Mk II would be the first contract received to build the Lancaster by the Coventry-based aircraft manufacturer and unlike its Merlin-powered sibling, would prove more technically challenging to construct, as the aircraft had been designed by Roy Chadwick to be powered by the Rolls-Royce unit from the outset.

ABOVE: Unusual view of the underbelly of prototype DT810 which shows how well the rear of the modified bomb bay doors have been incorporated into the lower rear fuselage. AUTHOR'S COLLECTION

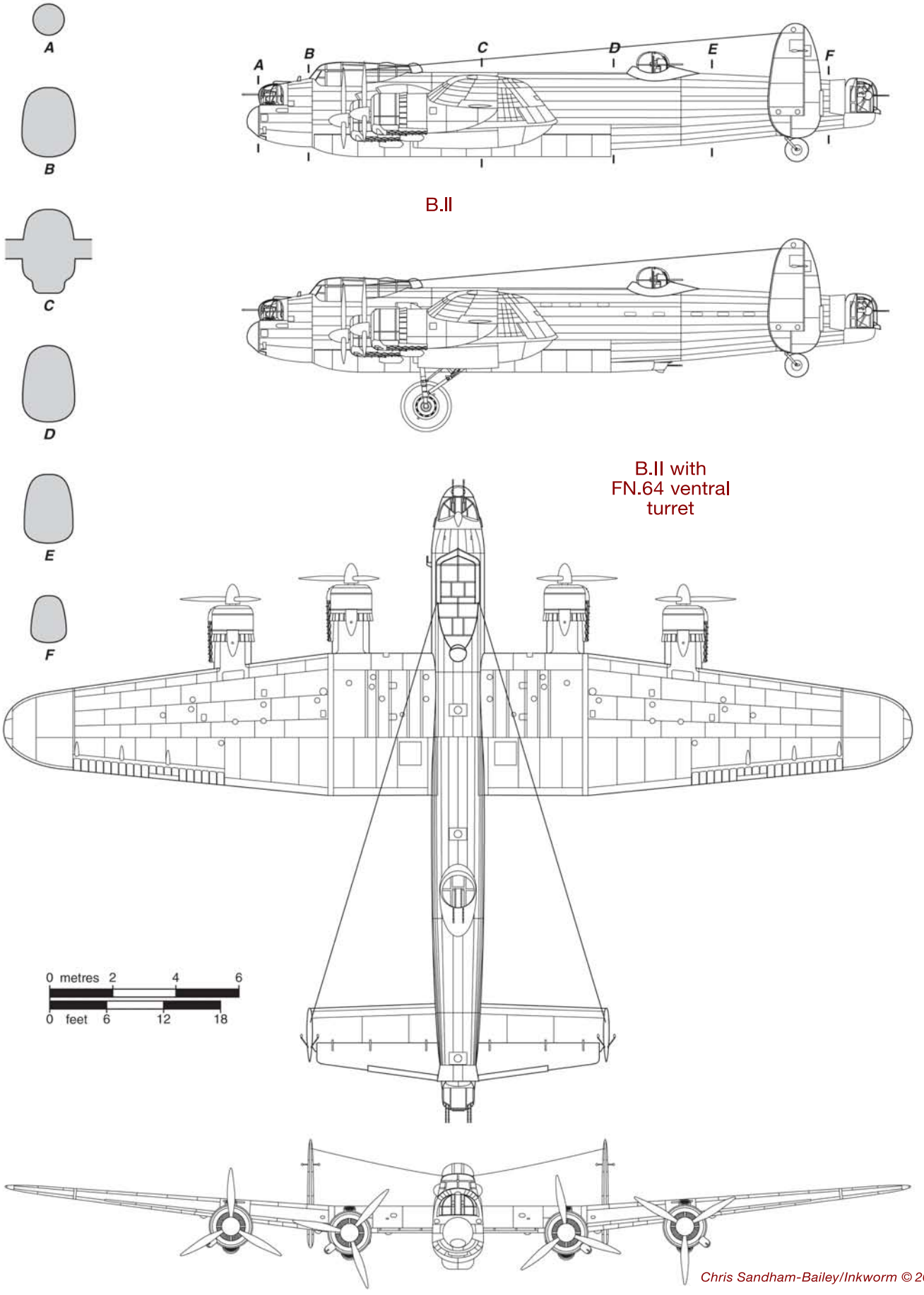
One of the reasons for the Hercules engine being selected as an alternative to the Merlin was simply because of the demand being placed on Rolls-Royce. The Merlin was the most common powerplant in RAF service at the time, the engine already powering the Battle, Spitfire, Defiant and marks of the Whitley, Wellington and Beaufighter to name a few. Another reason was simply as an insurance policy should the Luftwaffe manage to disrupt Merlin production, even though the Americans were already waiting in the wings to build the engine across the pond.

Feasibility

The concept of a Manchester with four engines, which would quickly evolve into the Lancaster, had barely been proven when the Air Ministry officially acknowledged the idea of

DATAPOINT *Take-off distance and cruising speed was superior to the Mk I, while ceiling was inferior.*

Avro Lancaster Mk II



598 *One Mk II which saw its days with 1668 HCU accumulated 598 flying hours; nearly four times the average.*

ABOVE: Originally two prototypes were ordered but DT810 was deemed sufficient to prove the theory that a Hercules-powered Lancaster would work. Hand-built at Chadderton, DT810 made its maiden flight from Ringway (Manchester International Airport) on November 26, 1941. AUTHOR'S COLLECTION

manufacturing a Hercules-powered variant. In fact, a pair of prototypes and a healthy production order was placed at the same time, which begged the question: why was a prototype even ordered? The main reason was that neither Avro nor Metropolitan-Vickers, who were both heavily engaged in Lancaster Mk I production, would be able to accept a contract for the Hercules version. However, Avro's Experimental Department was able to produce a prototype in very short order as sufficient components were available at the Chadderton plant, where a group of engineers could hand build the two prototypes ordered. These aircraft, serialled DT810 and DT812, could also be manufactured, test flown and have sufficient development flying carried out, which would expose any early problems, before the machine entered full scale production. In the meantime, Armstrong Whitworth would introduce the necessary jigs into their production lines which were currently churning out Whitleys.

The first – and what was subsequently to become the only – prototype Mk II, DT810, was transported by road from Chadderton and re-assembled at Ringway, from where it made its maiden flight on November 26, 1941.

Tests at the A&AEE

After successfully completing several early trials with the manufacturers, DT810 was sent to the A&AEE (Aircraft & Armament Experimental Establishment) at Boscombe Down on February 25, 1942. While the Mk I had already been extensively tested by the A&AEE a few months earlier, all focus was now placed on the performance of the Hercules engines rather than the aircraft as a whole. The trial was conducted by a pair of Boscombe Down scientists, Mr J J Unwin and Mr W J D Annand, under the heading, 'Fuel consumption range and operation of Lancaster Mk II, DT810, fitted with four Hercules VI engines'.

Testing began in early June 1942 and the basic work remit was to record the operational performance and capability of the Mk II at light and maximum overload weight. Fuel flow was carefully observed and it was not long before the scientists were able to plot the exact rate of flow at any given height or engine setting, the latter including the throttle and boost pressure settings. It was found that fuel flow increased by half a percent for every 1,000ft of height gained when the superchargers were set in the MS (low altitude) gear position and one percent in the FS (high altitude) gear.

The findings of Unwin and Annand were so precise they could be expressed in a basic formula as follows, 'Fuel flow for a given height and engine setting is proportional to 1/√ absolute air temperature.' This might seem like a great deal of trouble to find out such formulae but the time put in at the A&AEE, helped Bomber Command to operate the Mk II at maximum efficiency.

It was normal procedure to have the fuel set at a rich mixture during the climb, but, if the throttle settings were reduced to a position where the boost pressure just began to fall, an extra fuel saving was possible. Further fuel could be saved during the climb if the throttles were set to as lean a mixture as possible, although this would be limited by the temperatures of the cylinder heads.

Results showed that a weak mixture climb to 18,000ft could save as much as 89 gallons of fuel, enough to extend the range of the Mk II by 90 miles. Part of the resulting report stated, 'At 63,300lb the aeroplane takes off in 620 yards and [clears] a 50ft screen in 970 yards. A height of 15,000ft is attained in 20 minutes; 20,000ft in 36 minutes... In the near future it is possible that the fully equipped weight (without bombs or fuel) will be about 42,000lb. A typical loading for take-off weight of 63,000lb will be 2,154 gallons of fuel and a bomb load of 5,500lb. Assuming 60% of the fuel to be used on the outward flight, the aeroplane reaches the target at 53,700lb and leaves at 48,200lb after the disposal of the bomb load. On reaching the target the aeroplane could bomb from a service ceiling around 24,000ft.'

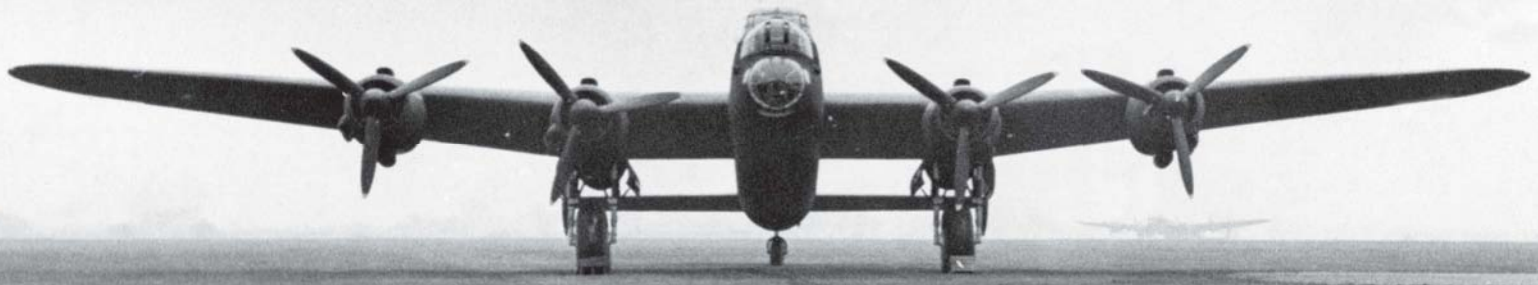
Demand for the Whitley

Armstrong Whitworth were no strangers to sub-contract work and they had been trying to put an Avro bomber into production since 1939, beginning with the Manchester, only to be thwarted when the contract was cancelled. In the meantime, demand for the Whitley continued and during 1941 was prolonged further than expected when orders came in from Coastal Command for the ASV-equipped Mk VII. As a result, production of the Lancaster Mk II was delayed and the order not officially placed until May 1941.

It was not until March 1942 that the Ministry of Aircraft Production (MAP) gave the order for production of the Whitley to cease so that the Lancaster Mk II could begin. It was destined to take twelve months to fully change over the Baginton assembly line from the Whitley to the Lancaster, the last of the former not leaving the factory until July 1943. Installation of new jigs and tools plus the removal of the old jigs and supporting equipment was done systematically as the Whitleys moved down the line.

The whole process was only disrupted once when, on June 25, 1942, a German bomber dropped several HE bombs and incendiaries on the Armstrong Whitworth-run Oram Works, in Newton Road, Nuneaton. Sub-assembly components and spar machining for the Lancaster was carried out at the works, much of which was destroyed in a subsequent fire and it was not until September 1942 that the site was back up to full production.

BELOW: The blunt end of a Lancaster Mk II pictured on December 6, 1943. Despite the lack of aerodynamics compared to the more streamlined Merlin, the Hercules engines provided enough grunt to propel the Mk II along at the same speed as its water-cooled counterpart. FLIGHT VIA AUTHOR



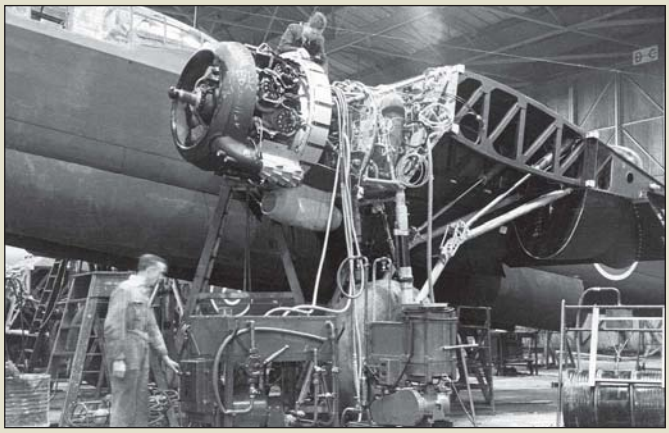
DATAPOINT *514 Squadron was the only unit formed with the Mk II on September 1, 1943 under the command of Wg Cdr A J Samson DFC.*

BELOW: DS652 about to depart on a test flight, before delivery to 115 Squadron at East Wretham. Prominent in this image are the Bristol Beaufighter type air intakes, which were introduced on all Mk IIs during 1943. AUTHOR'S COLLECTION

Hercules flexes his muscles

All aero-engine manufacturing was potentially vulnerable to air attack during World War Two but by creating a second option to power the future backbone of Bomber Command, the odds of any disruption to the flow of bombers was reduced

With its roots firmly entrenched as far back as the pre-World War One period, the Bristol Engine Company was a highly experienced organisation by the beginning of World War Two. The company struck out with its first air-cooled radial engine, the Jupiter in the early 1920s. Designed by ex-Cosmos Engineering employee, Roy Fedden (later Sir Roy Fedden), the Jupiter was destined to become the first of many radial designs and by the end of WWII, the company had produced more than 101,000 engines and more than half of them were the Hercules. 57,400 Hercules were produced, the vast majority of them proving to be ideally suited to Bristol's own highly-successful Beaufighter and the Armstrong Whitworth Albemarle, Handley Page Halifax, Short Stirling and Vickers Wellington.



ABOVE: The Bristol Hercules 'power egg' being installed by Armstrong Whitworth engineers. FLIGHT (KEY ARCHIVE)

In production from 1939 (first run in January 1936) onwards, the Hercules engine was the first of the sleeve valve designs to see extensive service. The Hercules had 14 air-cooled cylinders positioned in twin rows which are radially staggered from the crankcase. The crankshaft, which is divided into three sections, had Saloman dampers fitted into each crankweb so as to negate torsional vibration.

179 *The number of Mk IIs lost on operational missions.*

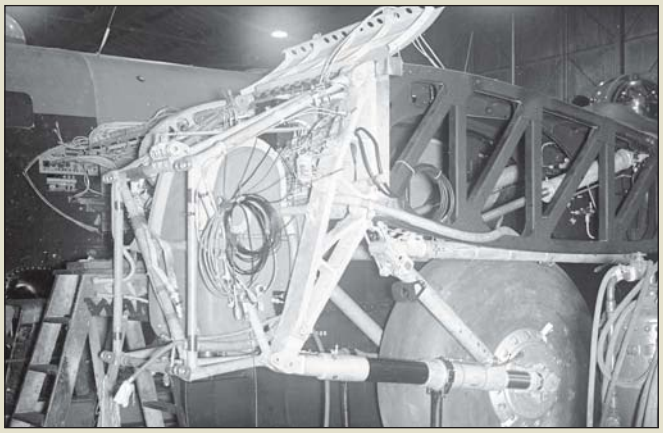
Unlike the Merlin, for example, which uses a traditional 'poppet' valve system, the Hercules' key feature is its sleeve valves. Each cylinder has an aluminium alloy cylinder barrel with a steel-alloy sleeve operating inside. An eccentric crank moves the sleeve up and down the barrel, enabling gases to enter and depart the cylinder.

Just like the Merlin XX, the Hercules VIs were initially supplied as Beaufighter powerplants and as such, could be connected with little trouble to the original sub-frames. Despite being 300lb heavier than the Merlin, no strengthening of the over-engineered sub-frames was required. However, the necessary modifications to the controls and positions of the ancillaries were more challenging.

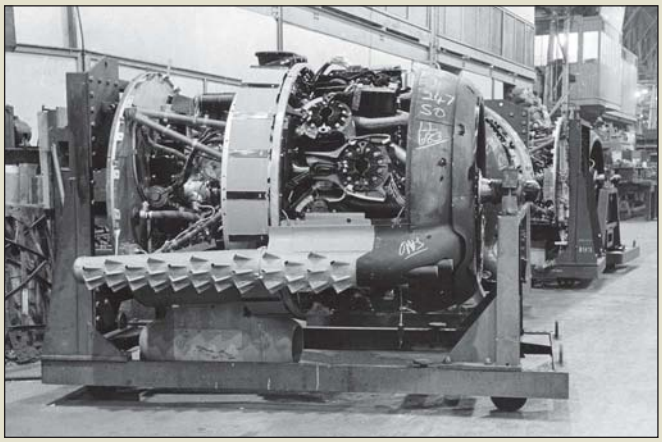
The first most obvious difference presented to a pilot in the cockpit of a Mk II with the Hercules VI was the addition of a single mixture control. This control, positioned to the right of the main throttle box, was interlocked to the throttles. This meant that if one or more of the throttles were either fully open or closed, the mixture lever (when in the 'weak' position) would return to the 'normal' position. With regard to the Hercules XVI, which differed from the VI by having an A.I.T. 132ME carburettor with automatic mixture strength regulation fitted, there was no pilot's mixture control. With the XVI, which was fitted to the vast majority of Mk IIs (first 26 aircraft were fitted with the VI), an economical mixture could be achieved by keeping the boost at, or below +2lb/sq in. The majority of the first 26 Mk IIs built were retro-fitted with the XVI engine and it has been suggested that a handful of the later production machines were installed with the VI.

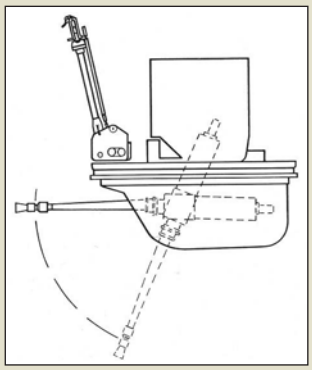
Engine modifications were also applied to the Mk II thanks to operational experience gained from the Beaufighter. The Beaufighter-type carburettor air intake was installed, which was not only more efficient than the early type, but also much lighter, the bomber gaining a 134lb weight saving. The same flame-damping exhausts fitted to the Beaufighter were also installed on the Mk II engines, giving them another small, yet significant advantage over the Mk Is and IIIs.

Another difference between Hercules and Merlin-powered machines was the rotation of the engine and in the case of the Mk II, the propellers turned to the left. Four electric fully-feathering Rotol RE6 propellers were installed with pitch settings of 17 degrees 45 minutes (fine) and 52 degrees 45 minutes (course) and 82 degrees when feathered.



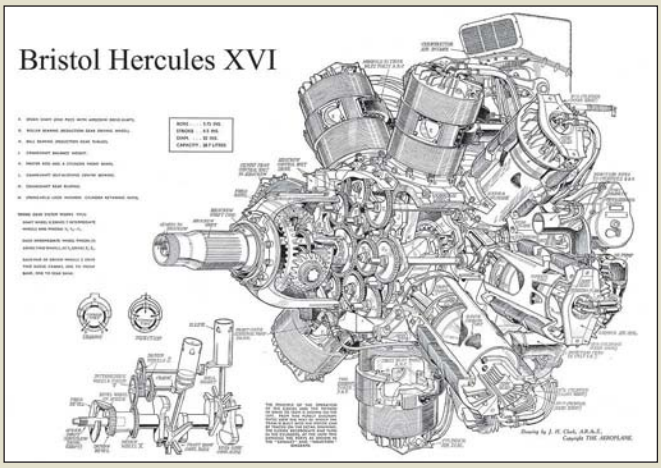
ABOVE: The fully exposed engine mount and undercarriage of a Mk II, at an advanced stage of construction on November 20, 1943. FLIGHT (KEY ARCHIVE)





ABOVE: There was also plenty of information chalked on various components including this Hercules engine which tells us that this will be the starboard outer of LL683. This aircraft was delivered to 514 Squadron and was lost on March 31, 1944 when it ran out of fuel returning from Nuremburg. FLIGHT (KEY ARCHIVE)

LEFT: The Nash & Thompson FN.64 Ventral Turret as fitted to a number, not all, of Lancaster Mk IIs. MANCHESTER BRANCH OF THE ROYAL AERONAUTICAL SOCIETY



ABOVE: An Aeroplane cutaway of the Hercules XVI produced by J H Clark during the war.

Power plant insurance

A major reason for the Lancaster Mk II's existence was through not un-warranted fears of the vulnerability of Merlin production. However, the expected aerial assault on the Rolls-Royce factories never came and during 1942 only one raid worthy of mention took place. This occurred on the morning of Monday, July 27, when a single Dornier Do217E-4 of KG2 dropped four 500kg HE bombs on the Nightingale Road Factory in Derby. A large section of the roof was torn off, forcing operations to switch to an alternative site while repairs were carried out. Local production of Merlin components was only reduced by five per cent for a period of three weeks, but this lone raider had highlighted how potentially vulnerable the Rolls-Royce network was.

As already mentioned, production of the Merlin in the USA was already underway but the benefit to British-built aircraft was still in doubt. The Packard-built engines were intended for the RAF's Lancaster Mk III but once the US entered the war there was a fear that the Merlins would be diverted to their own aircraft, including the Boeing B-17 Flying Fortress.

Bristol's network of workshops and production plants was just as vulnerable as Rolls-Royce's, but like the Derby-based firm, only one significant attack took place in 1942. On May 25 a single bomb hit 'C' Block of the Fry's Cocoa factory at Somerdale, Keynsham, Bristol. The block was used for assembly of engines but fortunately the device failed to explode and production was only disrupted for one day while the bomb was defused.

Crew

Normally seven aircrew operated the Mk II: pilot, navigator, air bomber/bomb aimer (also

operated front turret when required), wireless operator (signaller from late 1943), air gunner (mid-upper), air gunner (rear), flight engineer (from mid-1944, trained to sufficient standard to fly the aircraft back to Britain to effect crew bale out); an extra air gunner joined some sorties if carried out during daylight or at low-level to operate the ventral FN.64.

GENERAL DESCRIPTION

Structure

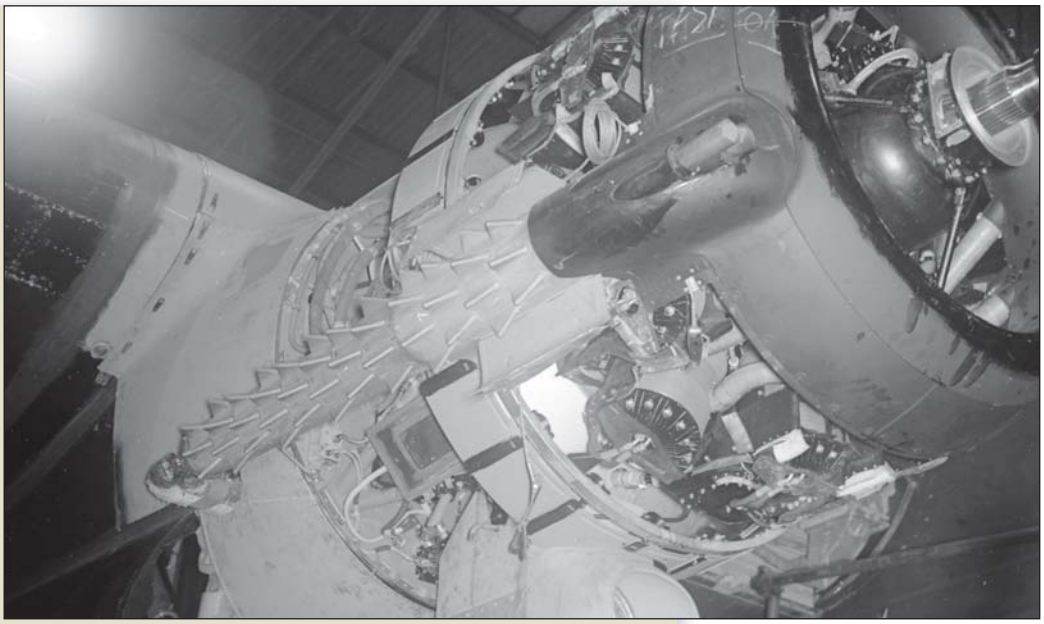
There is no need to go into extensive detail of the construction of the Lancaster Mk II as this was covered in Lancaster Mk I and Mk III Database published in the December 2011 issue of *Aeroplane Monthly*. However, the main features of the bomber were a two-spar type mainplane with a centre-section of parallel chord and thickness which had tapering outer sections constructed in a pair of port and starboard sections. The ribs were made of aluminium alloy pressings and were flanged and swaged and covered in aluminium sheeting. The fuselage was made of Duralumin and constructed in five sections, each incorporating transverse formers and longitudinal stringers.

Undercarriage

The main undercarriage comprised of a pair of retractable single-wheel units fitted with Dowty oleo-pneumatic shock absorber struts. The main wheels were Dunlop AH2238 17.5 x 19in wheels fitted with Dunlop SKA641 24 x 19in tyres. The non-retractable tailwheel was fitted with a Dunlop AH8103 10 x 10in wheel fitted with a Dunlop NX11 12.5 x 10in tyre.

Control surfaces

The Lancaster's ailerons spanned 17ft 3½in, had a mean chord of 2ft 6in and a surface area (including trimming tabs) of 85½ sq ft. Each aileron had up/down movement of 16 degrees while the trimming could be adjusted up/down 19 degrees. The split trailing edge flaps were positioned between the ailerons and fuselage and had a movement of 56 degrees. The elevators had an area of 82 sq ft, downward movement of 28 degrees up and 14½ degrees down while the elevator trim tab could be adjusted six degrees up or down. Both rudders had a movement of 22 degrees to port and starboard.



ABOVE: The flame dampers of the Mk IIs Hercules XVI engine were incredibly efficient at eliminating the tell-tale glow of a distant bomber.

Hercules VI

TYPE: 14-cylinder air-cooled two-row radial
POWER OUTPUT: 1,675hp at 2,900rpm at 4,500ft
BORE: 5.75in (146mm)
STROKE: 6.5in (165mm)
DISPLACEMENT: 2,364 cu inches (38,723cc)
DIAMETER: 52in (1,320mm)
DRY WEIGHT: 1,930lb (875kg)
SUPERCHARGER: Rear-mounted, two-speed centrifugal, single-stage
SUPERCHARGER RATIOS: (low gear) 6.68 to 1; (high gear) 8.35 to 1
FUEL: 100/130

Fuel and Oil

The Mk II's total fuel capacity was 2,154imp gal of 100 octane fuel spread between five tanks: two 580, two 383 and a pair of 144imp gal capacity all installed in the wings. Provision was also made for one or two auxiliary fuel tanks of 400imp gal capacity to be installed in the bomb bay. From March 1943 onwards, these self-sealing tanks were an option for the Mk II; with four 37½imp gal tanks could carry 150 Imperial gallons of oil.

ARMAMENT

Defensive

Beginning at the front of the aircraft, the standard nose turret for all marks of Lancaster was the Nash & Thompson FN.5A fitted with a pair of .303in Browning Mk II machine guns and aimed by a Barr & Stroud G Mk III reflector sight. The hydraulically operated turret, of which earlier versions were fitted to the Manchester, Stirling and Wellington, would be the only defensive armament of the bomber to remain throughout its operational life, with the exception of those Lancasters (including one Mk II, LL735) which had them removed. The FN.50 dorsal turret was also another standard feature of all Lancasters until the arrival of the larger Martin-type turret in the Mk VII. With regard to the rear turret, this was initially the FN.20A fitted with a quartet of .303in

BELOW: The second production Mk II, DS602 which spent its entire career with the A&AEE at Boscombe Down and was not SOC until September 11, 1946. AUTHOR'S COLLECTION

1,210 *The most Mk II operations flown by a 6 Group unit was 1,210 by 408 (Goose) Squadron.*

machine guns, again aimed by G Mk III reflector or a Gyro Mk IIc sight. Once the Mk II was in service, these began to be replaced by the FN.120 with an improved gyroscopic gun sight, better heating system and ammunition feed; this nose turret was also 40lb lighter than its predecessor. The FN.20 was then relegated to Mk IIs serving with the HCUs (Heavy Conversion Unit).

Senior staff had intimated that the Mk II would have greater employment on daylight operations than its Merlin-powered counterparts, necessitating additional defensive armament. As such, a ventral position was created immediately aft of the bomb bay and the FN.64 turret was equipped with a pair of .303in machine guns. The turret was designed to be operated by an eighth crew member, aiming through a periscope. Discretion for its use or even fitment was down to the individual squadron commanders, hence there were Mk IIs with/without the guns fitted serving in the same unit. When not installed, a further weight saving of 122lb could be achieved and with the arrival of the lethal *Schräge Musik* method of under-fuselage attack, the Canadians in particular, were reluctant to remove this form of defence. It was most likely that the Canadian operators of the Mk II also installed a temporary ventral position with a single .50in Browning machine-gun into those aircraft not fitted with the official FN.64 turret.

Offensive

While the Lancaster Mk I and Mk III were cleared to carry a bomb load of up to 18,000lb, the Mk II was only capable of carrying 14,000lb. This still gave the bomber the ability to deliver a wide range of ordnance in many combinations, including the 8,000lb blockbuster which was effectively a pair of 4,000lb 'Cookies' joined in tandem. To carry the blockbuster a number of Mk IIs were fitted with bulged bomb-bay doors. There were two types of doors available, one 'in service' modification which had an obvious 'kinking' while the other was a post-production type which was installed to Mk IIs in general. Both types of doors could be fitted during a repair or servicing. Once fitted, a gap was created to the rear of the doors and the FN.64 turret, and to maintain a degree of aerodynamics a fairing was introduced to help smooth out the lower fuselage. This modification, coupled with the position of the ventral turret, meant that the H2S, enclosed in its large fairing was never installed in the Mk II.

'How would you like to drive 8,000 horses?'

By Jim Macintosh

PILOT'S PERSPECTIVE

Our instructor on 1679 HCF (RAF East Moor) was Fg Off Morton, a Canadian pilot who had completed a tour. First he took us around the Lanc just to show us the aircraft and go over the checklist. It really towered over us after the Wimpey [Vickers Wellington].

We went inside, where he explained the layout. From the first instrument inside the door to the Elsan. The ammo trays stretched to the turrets. Then forward over the main spar to the wireless op's and navigator's stations. He showed us the master switch and explained its operation. Then to the cockpit. There was a bewildering array of dials, gauges and levers. "Just remember you've got four engines instead of two so there are twice as many engine dials and levers as the Wimpey. The controls are the same but better arranged. It just looks complicated."

He went through the cockpit thoroughly, explaining every lever, dial and gauge, then left us to familiarise ourselves with the new aircraft. Sure felt good in the pilot's seat – not as comfortable a seat as the Wimpey – but everything was within easy reach and you had excellent visibility. Tomorrow we would be airborne in a four-engined kite.

Our circuits and bumps started the next morning, November 13, with Fg Off Morton in DS626. Before starting the engines he went through the pre-starting check. Then the starting, communication with ground crew, signals for starting and start-up from port to starboard. The running up and engine testing procedure was the same as the Wimpey. Warm up at 1,000 rpm. Then each engine in turn: check pitch control: at full throttle check revs are 2,800: throttle back to +6lb boost and check mags.

Before taxying out he gave me some advice. "You have to take special care when taxying the Lanc. It'll taxi faster than the Wimp if you let it. Start out slow and watch your brake pressure; don't let it get down. Steer with your outers as much as you can and use your brakes to control speed. Stop if necessary to build up brake pressure. Don't idle the engines below 800 revs or you'll foul the plugs. Just take it easy till you get the feel and you'll have no trouble." He waved the chocks away and taxied around the perimeter track for take-off. It looked so easy.

While taxying, some more advice. "Some pilots have the engineer help with the throttles, wheels and flaps during take-off and landing, but I prefer to do it all myself. If anything happens I know immediately what to do; there is no confusion and less chance of a mistake. The throttles fit perfectly in your hand; the thumb and little finger can control the outers and the inners fit in your palm. Just before take-off tighten the throttle tension so you can just move the throttles; they will hold position at full throttle and won't slip when you let them go. The only bad thing about the Lanc II is that it tends to swing to starboard on take-off. You control this by letting the port-outer back a bit if she starts to swing. You can't leave this to the engineer as you are the one who knows when she starts to swing. When you get some speed you can control swing with the rudders. Lift her off the ground at about 95. Get the wheels up and if there are no trees or obstructions at the end of the runway, hold her down a bit to get speed up faster. Then start climbing. Let the flaps up slowly five degrees at a time, especially when you are fully loaded."

Before turning onto the runway we stopped. He went through the take-off check: trims; revs; flaps; mags; then called for take-off clearance. We moved onto the runway far enough to get the tail wheel straightened. He applied the brakes, then opened the throttles to about 2,000rpm and DS626 shook in anticipation. The brakes were released, the throttles shoved fully forward and we were off.

The old Wimpey had lumbered down the runway; the Lanc flew! The roar of the engines engulfed you; you couldn't even hear yourself think! In no time the tail was up and she floated free of the ground. Wheels up; back to climbing boost and revs; flaps up slowly, nice and smooth; not even a feeling of any change in attitude. After the Wimpey she seemed to climb like a Spit. "Best climbing speed is 165. You can drop the nose a bit and get your speed up to say 175 but the rate of climb will be less." We climbed out of the circuit to about 6,000ft and levelled off. Morton showed us what the Lanc could do. First turns and banks. The tighter the turn, the more rudder was needed to keep the nose up, same as the Wimp. He tried a stall. She sort of stumbled before the nose dropped; no trouble there. He cut one outer; hardly noticed any difference. Both outers and speed had to be reduced, but she still flew alright with a bit more throttle and revs. Both on one side, a bit more difficult; the 'dead' wing up and a bit of rudder trim; more throttles and revs on the good ones and she kept going. "She won't go very long on one motor; won't hold height, and at full power on the remaining motor you'll have a problem keeping direction, and of course the motor won't last long."

He showed me how to get the engines in phase. "You hear them first and adjust the sound with the revs." He flew it with only the trims and she responded quickly. He told me to try it. Just to sit there at the controls, even on the right side, sure gave me a sense of power; just like the recruiting posters back home. 'How would you like to drive 8,000 horses? The sweep of the wings and the four discs of the spinning props – the ultimate bomber!' I went through turns, banks, climbing, a stall; she handled so smoothly.

"Take her back to base and we'll try a couple of circuits." I brought her into the circuit, where he took over and called for permission to land. "Landing is the same procedure as the Wimpey; down-wind leg; wheels down and bring the speed back. Crosswind leg; start the flaps and reduce speed. On the approach, get the speed back to 130 and full flap. You can fly the Lanc on if you have lots of runway, but go for the three-point. Bring her over the end of the runway at about 110, level out, and then cut the motors; she'll settle on at about 90-95. I'll land; you watch straight ahead to get the feeling for the greater height after the Wimp." She touched down like a bird. We did a couple more circuits and landings to give me a better feel for the higher aircraft. Tomorrow I was to take it from the left side.'

DATAPOINT *The aft facing FN.64 ventral turret could be traversed through 100°.*

Syerston debut

Bomber Command was still building up its Lancaster force when the Mk II joined and the aircraft's contribution was fully appreciated by Commander-in-Chief, Sir Arthur Harris

ABOVE: Mk II DS723 of 408 (Goose) Squadron (RCAF) lifts off from Linton-on-Ouse in the summer of 1943. The bomber failed to return from a raid on Berlin on November 26/27, 1943. AEROPLANE VIA AUTHOR

Long before the Mk II was due to enter service, the Vice-Chief of the Air Staff, Air Chief Marshal Sir Wilfred Freeman, came up with a rather ambitious proposal for the bomber. Swept along by the moderate success achieved by the low-level, daylight raid on Augsburg in April 1942, Freeman suggested a batch of specially modified Mk IIs would be ideal for this type of operation. The Hercules engines, which lacked the vulnerable glycol engine cooling system of the Merlin was the linchpin to the plan.

Freeman's idea was to have 1,710lbs of additional armour installed to protect the crew, fuel tanks and air coolers and considerably more .303in ammunition. The Commander-in-Chief of Bomber Command, Air Chief Marshal Sir Arthur Harris was fervently opposed to the idea, pointing out that the modifications would reduce the Lancaster's potential bomb load to just 2,000lb. These modifications would delay further the Mk II's entry into service and at this stage of the war Harris only had four squadrons of Mk Is at his disposal. However, Harris got his own way in the end and supported the idea of using the Mk II to deliver much higher bomb loads; the exact amount would only be established after trials of the first production aircraft by the A&AEE.

The first Mk IIs rolled off the Armstrong Whitworth production line in September 1942 and both DS601 and DS602 were being trialled at the A&AEE from September 24. They were joined by DS606 on November 6 while the remainder, up to DS613 and DS621 were allocated for service trials.

Brief appearance with 5 Group

Based at Syerston, Nottinghamshire, under the command of Wg Cdr R M Coad AFC, 61 Squadron was the first recipient of the Lancaster Mk II in October 1942. A bomber unit since re-forming at Hemswell in March 1937, 61 Squadron was already an experienced unit and had been operating the Merlin-powered Lancaster since April 1942 when based at Woolfox Lodge, Rutland.

Ten aircraft were allocated to the squadron: DS603, DS604 (QR-W), DS605 (QR-X), DS607 (QR-N), DS608 (QR-O), DS609 (QR-R), DS610 (QR-S) and DS612, DS613 and DS621, enough to make up a single flight. The flight then spent the next nine weeks familiarising themselves with their new Hercules-powered machines in preparation for operations in the New Year. Although not officially declared as such, the ten Mk IIs allocated would take part in operational trials under the guidance of Wg Cdr Coad and all experience gained, good or bad, would be used to improve the bomber as the production lines gained momentum and squadrons became fully converted to the type.

The Mk II's operational debut came on January 11/12, 1943 when two aircraft, DS607 and DS610 were part of a nine-strong contribution from 61 Squadron on a raid on the Krupps Works in Essen. At 16:40 the first of the two Mk IIs to take off from Syerston was DS607, flown by Sgt A Meagher. Unfortunately, it was an inauspicious start. Meacher was forced to return early as he was

ABOVE: Mk II, LL666 in service with 115 Squadron at Witchford in early 1944. A lucky aircraft, LL666 was later transferred to 514 Squadron where, along with DS842, it carried out the final operation by a Lancaster Mk II to Neuss on September 23/24, 1944. The bomber then served with 1668 CU, the RAE and became an instructional airframe before it was SOC in January 1946. VIA AUTHOR

150 *The average number of flying hours carried out by operational Mk IIs.*

ABOVE: The fourth production Mk II, DS604, pictured during service trials with 61 Squadron at Syerston in early 1943. Later transferred to 115 Squadron, the bomber was lost on a raid to Frankfurt on April 10/11, 1943 when it crashed at Le Thour (Ardennes). AUTHOR'S COLLECTION

unable to get the bomber above 18,400ft; he jettisoned his bombs in the North Sea and was back on the ground at Syerston at 20:20. The second Mk II to make its debut that evening was DS610, flown by Flt Lt G W Gilpin, which departed Syerston at 1700hrs. Gilpin was also forced to return early as he could not manage to climb above 14,000ft, landing ten minutes before Meagher's aircraft.

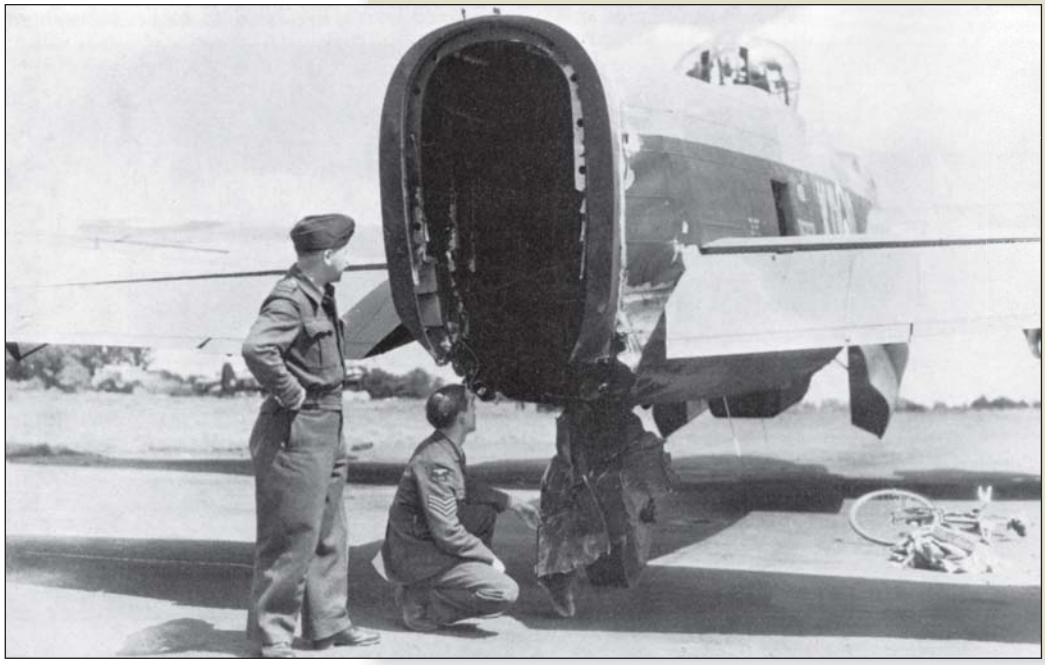
The raid itself was not particularly successful and out of 72 Lancasters of 1 and 5 Group taking part, only a few claimed to have hit the target, despite being led by four Mosquito Pathfinders. Five of the nine 61 Squadron aircraft taking part returned early with technical problems, including one Mk I which also failed to reach operational height – this conveniently helping to cover the poor initial contribution the Mk IIs had made.

Yet to be blooded in action, Wg Cdr R M Coad decided to take DS607, accompanied by 16 other Lancasters, to attack the Alexander Platz Railway station in Berlin on January 16/17, 1943. Other aircraft taking part included Mk IIs DS608 (Flt Sgt J V Cockshott), DS609 (recently promoted Plt Off A Meagher), DS609 (Flt Sgt I A Woodward) and DS610 (Flt Lt G W Gilpin).

The raid was successful for the 201 aircraft taking part, which saw the full use of proper target indicators (TIs) for the first time. Of 61 Squadron's Mk IIs, all but Coad's aircraft bombed the target, while the commanding officer's aircraft still managed to bomb the second target at Greifswald, 100 miles north of Berlin on the Baltic coast. Engine trouble had forced Coad to divert DS607 to this last resort target and all, with the exception of Sqn Ldr E D Parker in Mk I, ED352 returned safely.

The small band of Mk IIs continued to take part in 61 Squadron's operations (with the exception of DS603-605) until March 1943, when all ten aircraft were transferred to 115 Squadron. Wg Cdr Coad wrote a number of reports regarding the performance of the Mk II, none of which were particularly complimentary.

BELOW: 115 Squadron had one of the most impressive operational records of the Second World War which included the second highest number of sorties flown for Bomber Command, the highest number of bombs dropped in 3 Group and the second highest tonnage (approx. 23,000 tons) in Bomber Command. On the down side, the squadron suffered the most losses of Bomber Command, with more than 200 aircraft failing to return. The crew of this Lancaster Mk II, with the exception of the rear gunner, were some of the lucky ones. IWM VIA AUTHOR



The first complete Mk II unit

As already mentioned, the next unit to be equipped with the Mk II was 115 Squadron, which, unlike 61 Squadron, would completely replace its Wellington Mk IIIs with the new bomber. Reformed at Marham with the Fairey Hendon in June 1937, 115 Squadron was the fifth RAF unit to re-equip with the Wellington and under 3 Group control, the squadron would feature prominently in early Bomber Command operations.

The squadron had settled at East Wretham, Norfolk in November 1942 and it was here, on March 15, 1943, under the command of Wg Cdr A F M Sisley, that the unit was declared operational on the Lancaster Mk II, having received the type only a few days earlier.

An all-grass airfield, East Wretham's main runway was 1,880yds long compared to the later Bomber Command 2,000yd-long standard concrete runway. However, one of the Mk IIs strengths was its take-off power, and even under full load conditions, the Hercules engines made short work of the comparatively small airfield.

After several days' worth of cancelled operations, the Mk II

DATAPOINT *Dual controls were introduced in 1943 for conversion training; initially a local mod, after a few months a Manchester conversion kit was made available to all marks.*

began its operational debut with 115 Squadron and 3 Group on March 20/21, 1943 when four aircraft were detailed for a mining operation. Wg Cdr Sisley set off from East Wretham at 1920hrs in DS623, loaded with six Mk I-IV 1,500lb mines. He was followed by Plt Off H J Ross in DS625, Plt Off H Minnis in DS622 and Sgt D Rhys in DS612. The target area was off the western tip of the French island of Île de Ré, approximately 22 miles West-North-West of the U-boat base in La Rochelle. The operation was a huge success, all mines being accurately placed from heights of between 800 and 1,000ft and all aircraft had returned safely to East Wretham by 0035hrs.

The following night 115 Squadron's first major operation as part of 3 Group took place when 357 aircraft were tasked with bombing the port of St Nazaire. Led again by Wg Cdr Sisley, 115 Squadron contributed seven aircraft, only to be recalled enroute. However, Sgt Rhys in DS612 failed to receive the order and planted his 1,260 4lb Incendiary Bombs (IBs) onto the target.

One of the pilots who set off on the St Nazaire raid was a certain Flt Lt I W Bazalgette in DS615, who had been serving with the unit since September 1942. Bazalgette quickly settled into Lancaster operations, although during his first full sortie to Duisburg on March 26, the bomber was hit by flak which resulted in a fraught belly landing back at base. Raids to Berlin and Essen followed and in early April, Bazalgette's 'determination and skill on operations' was rewarded with the DFC on May 29, 1943. Promotion to Squadron Leader followed on June 12 and on August 12, flying DS664, 'KO-X', to Milan, Bazalgette finished his tour of operations. After a tour of duty as an instructor at 20 OTU, Lossiemouth, Bazalgette returned to operations with 635 Squadron. He lost his life in August 1944 whilst in the role of Master Bomber and was awarded a posthumous Victoria Cross.

Despite the Mk II's slight inferiority to its Merlin-powered sibling, 115 Squadron quickly settled into operation with their new aircraft, and aircrew that had been flying in Wellingtons deemed it a vast improvement. Before March was over, the squadron took part in operations to Duisburg and Berlin and it was during a trip to the latter on March 29/30 that Bomber Command suffered its first Lancaster Mk II loss, when DS625 (KO-W), along with Plt Off H J Ross RCAF and his crew were lost without trace.

ABOVE: AOC (Air Officer Commanding) 6 (RCAF) Group, Air Vice Marshal C M 'Black Mike' McEwen (right) pictured with 426 (Thunderbird) Squadron CO, Wg Cdr Bill Swetman at Linton-on-Ouse. McEwen had flown with Swetman to Berlin the previous night in the Mk II in the background. H J THOMAS VIA AUTHOR

Keeping the crews flowing

Only days before the first Mk II loss, the first examples of the type were being delivered to 1657 HCU (Heavy Conversion Unit) at Stradishall. The handful of aircraft, which included the first production machine, DS601, were organised into the Lancaster

BELOW: Mk II, LL701 'KO-F' of 115 Squadron was lost without trace over Schweinfurt on February 24/25, 1944. Flt Lt J C Hornby and his six crew are commemorated on the Runnymede Memorial. WWW.INKWORM.COM

BELOW: Another view of 426 (Thunderbird) Squadron Mk II, DS689; note the bulged bomb bay doors and lack of ventral turret, a feature the Canadians liked. FLIGHT/AEROPLANE (KEY ARCHIVE)

20 *The average number of sorties flown by an operational Mk II between March 1943 and September 1944.*

ABOVE: 408 (Goose) Squadron Mk II, DS704 tucks up her undercarriage as she departs from Linton-on-Ouse in 1943. Yet another casualty, but not by the enemy on this occasion, DS704 was believed to have been brought down by 'friendly' fire from the rear turret of another Lancaster whilst on a raid to Frankfurt on December 20/21, 1943. Four of the crew, including the pilot, Plt Off L C Morrison, RAAF survived to evade capture, a fifth became a POW while two others were killed. FLIGHT/AEROPLANE (KEY ARCHIVE)

Mk II Flight and were detached to East Wretham, then home to the only operational Mk II unit. 1657 HCU's main duty was to convert crews to the Stirling, and training crews on the Lancaster Mk II was not a high priority. As a result, the Lancaster Mk II Flight was removed from 1657 HCU and instead, provided the nucleus for a more dedicated unit, 1678 HCF (Heavy Conversion Flight) which was formed at East Wretham on May 18, 1943 with eight Mk IIs on strength.

East Wretham became a very busy place with the resident unit, 115 Squadron having 16 Mk IIs on strength, a reserve of four and the eight aircraft operated by 1678 HCF. The HCF followed 115 Squadron to Little Snoring on August 6, 1943 but made a departure on September 16 when it was moved to Foulsham and redesignated as 1678 HCU, still with an establishment of eight Mk IIs. This was raised to 12 Mk IIs following a final move to Waterbeach on November 23 and, once the withdrawal of the type was finalised, 1678 HCU was disbanded on June 12, 1944.

Four further conversion units were formed specifically for the Mk II, beginning with 6 (Canadian) Group, 1679 HCU stationed at East Moor. Initially equipped with four aircraft, the establishment peaked at twelve Mk IIs in October. The unit was moved to Wombleton on December 13 so that it could work in unison with 1666 HCU, another 6 Group unit. A much larger unit, 1666 HCU was also operating the Mk II and several marks of Halifax and absorbed 1679 HCU on January 27, 1944. 1661 HCU at Winthorpe and 1668 HCU at Bottesford also operated a few Mk IIs until mid-1944.

Canadians join in

In the middle of 1943 it was decided to allocate a number of Mk IIs to 6 Group, who were operating the Hercules-powered Wellington and the unpopular Merlin-powered Halifax Mk II. Three squadrons, all operating as part of 62 'Beaver' Base stationed at Linton-on-Ouse, would re-equip with the Mk II, beginning with 426 (Thunderbird) Squadron – under the command of Wg Cdr L Crooks, DSO, DFC – which converted from the Wellington Mk X in June 1943.

Although they were sad to see their old Wimpeys go, 426 Squadron quickly settled into operations with the Lancaster Mk II, which introduced a new level of performance and crew comfort. The squadron's first Mk II operation was a sobering one to Peenemünde on August 17/18 as part of a 596-strong force of Lancasters, Halifaxes and Stirlings. Led by Crooks, 426 Squadron contributed nine aircraft to this important and ultimately successful raid which came at a high price. Two 426 Squadron Lancasters failed to return, including DS681 flown by Wg Cdr Crooks, who perished along with five of his crew. The unit would go on to suffer heavy losses which could not be blamed on the aircraft but rather the operation it had become embroiled in: the first phase of the Battle of Berlin. During one operation to the city on December 16/17, 1943, four aircraft failed to return and by the time the squadron converted to the Halifax Mk III in May 1944 a total of 28 Lancasters had been lost and a further seven destroyed in crashes.

Next to re-equip with the Mk II was Canadian 408 (Goose) Squadron, also based at Linton-on-Ouse in August 1943, followed by 423 (Leaside) Squadron, which operated from East Moor and completed the base conversion.

BDU & G-H

The Lancaster Mk II can be credited with pioneering the use of the bombing aid G-H which was introduced into RAF service for small targets that needed to be attacked accurately and which H2S was unable to cope with. The basic principle of G-H relied upon a single beam from the bomber being relayed by a pair of ground stations which returned a position plot and as well as this the device proved useful for continuous navigation.

Two Mk IIs, DS671 and DS672 were allocated to the Bombing Development Unit (BDU), which, after forming at Gransden Lodge in July 1942, had moved to Feltwell in April 1943. Trials of G-H began in June 1943, but the airspace of East Anglia proved too congested for such a set-track trial and both bombers were despatched to the relatively quieter skies over South Wales to operate from Fairwood Common. The airfield at Llandow was used as an aiming point and with a number of mobile stations on the ground, 58 photographic checks were made to prove that G-H worked, and worked well.

All of the results were studied in detail by Bomber Command scientists, who suspended the trial in August so that a group of specially selected signallers could be trained to operate the G-H sets. This same

DATAPOINT *Some of the Mk IIs were assembled at Sywell.*

RIGHT: Sqn Ldr Bill Russel watches 408 (Goose) Squadron ground crew, LAC Jack Murray, LAC George Delday and Cpl 'Pop' Percival, service his Mk II at Linton-on-Ouse on May 12, 1944.
AUTHOR'S COLLECTION

select band was then used in live trials which saw DS671 and DS672 drop 150 bombs. G-H was installed in a number of operational Lancasters, with preference to those fitted with bulged bomb bay doors, capable of carrying an 8,000lb bomb, which of course meant the Mk II.

On the night of November 3/4, 1943, 38 Mk IIs (13 from 3 Group and 25 from 6 Group), joined a total force of 589 aircraft to attack the Mannesmann tubular-steel works on the northern edge of Düsseldorf. It was not a copybook attack for the Mk II G-H force, which saw five aircraft return early; 16 came back with unserviceable sets, having bombed the town on markers instead of the intended target, and two aircraft (from 408 and 426 Squadron) failed to return at all. This left 15 Mk IIs which managed to bomb the factory using G-H blind and later photographic reconnaissance revealed that approximately half of the bombs dropped fell within half a mile of the aiming point. The level of accuracy was way above expectations and local reports described how several assembly halls were burnt out. The crews were left with a different impression of the G-H equipment, which was removed from their aircraft a few days later.

G-H had proved itself to be a useful bombing aid, assisting with missions as far east as the Ruhr but the Battle of Berlin was about to begin and H2S would prove adequate enough for this long-distance target. The G-H sets were installed in aircraft on mine-laying duties and would not come into their own until the Allied invasion of Europe the following summer.

As the build-up to the full use of G-H continued, a number of ground stations were established across the country and DS672, still serving with the BDU which had re-located to Newmarket, was tasked with trialling the accuracy of the system again. The target for this trial, which combined the test of a new 4lb incendiary, was the bombing range at Donna Nook on the north eastern coast of Lincolnshire.

ABOVE: 514 Squadron Mk II, LL716 originally served with 115 Squadron and was lost on a daylight operation to the flying-bomb storage site at Bois de Cassan on August 3, 1944. All of the crew survived, two evading capture and six becoming POWs.
WWW.INKWORM.COM

BELOW: Images of 432 (Leaside) Squadron Mk IIs are very rare because the unit only operated the type from East Moor between October 1943 and February 1944
J MCNULTY COLLECTION, G B ULLETT VIA AUTHOR

282 *Of the 301 Mk IIs built, 282 of them were allocated to RAF and RCAF squadrons.*

ABOVE: A snapshot of Mk II, DS842 *Fanny Firkin II* of 514 Squadron during a visit to the home of the 401st Bomb Group at Deenethorpe on May 3, 1944. AUTHOR'S COLLECTION

Gradual withdrawal

From November 1943, Armstrong Whitworth had been phasing the Lancaster Mk I into production behind the Mk II, which was a considerably easier task than it had been with the Whitley. With such a comparatively small number of Mk IIs produced, it was already becoming difficult to maintain the established five squadrons as losses and repairs began to take their toll. The Halifax Mk III, powered by the same Hercules XVI as the Mk II, was the obvious replacement.

It was the last unit to receive the Mk II, 432 Squadron under the command of Wg Cdr W A McKay, which would be the first to give them up. The squadron had flown their first Mk II operation on November 18, 1943, when four aircraft were detailed to complete a night sea search. Unfortunately two of the bombers had to return with technical problems, which did not fill the crews with confidence.

Noticing the drop in morale, McKay chose to lead the unit's next operation, a raid to Berlin on November 26/27, as part of a force of 443 Lancasters and seven Mosquitoes. The raid was a success for 432 Squadron, with no losses and good attacks by all, and quickly re-instilled new confidence in the bomber. However, on February 3, 1944, the unit had already been earmarked for the Halifax Mk III and after just 16 operations (comprising 190 sorties) the Mk II was clinically withdrawn six days later.

For 115 Squadron, the Mk II withdrawal began in March 1944, after a particularly rough period for the unit, which had been suffering high losses during the final stages of the Battle of Berlin. After one attack on the German capital on March 24/25, 1944, 44 Lancasters and 28 Halifaxes failed to return – losses included four Mk IIs from 115 Squadron and a single machine from 514 Squadron. From this night onwards, replacements became increasingly harder to find, coupled with the last example being delivered the same month.

By April, 115 Squadron had managed to part-convert to the Mk I and Mk III without being removed from operations, the unit still managing to achieve sortie rates of 50 for the Mk I, 58 for the Mk II and 59 for the Mk III. The final few Mk II sorties were flown by 115 Squadron in early May and the rest of the war, which continued to be an expensive one, was completed under Merlin power.

Next to lose their Mk IIs – in favour of the Halifax Mk III – was 426 Squadron, in May 1944, an event described by the unit diarist with 'many a groan and a heartache' as many crews had hoped that they would finish their tours of duty on the Lancaster. The squadron's final month of operations in April had seen 58 sorties flown without loss, only two of which were unsuccessful.

D-Day

By the time the Allied invasion had taken place on June 6, 1944 only two Mk II squadrons remained operational, namely 408 and 514 Squadron. The former departed Linton-on-Ouse during the early hours to attack the coastal battery at Longues and it was not until all had returned safely to their Yorkshire home that the aircrew began to realise that they had taken part in such an important operation. The switch to communication targets throughout Northern France went a long way to extending the service life of the Mk II in the two remaining squadrons and losses fell dramatically compared to those suffered enduring the Ruhr defences.

Following the invasion, the use of G-H was brought back into the frame and it was decided to re-introduce the device into the Lancasters of 3 Group. DS671, which was still on strength with the BDU, was brought back into use to continue testing the system. However, during the warm summer of 1944, the bomber had little chance of reaching the required 25,000ft to test the G-H properly and on one particular day in July could only manage 21,500ft. The BDU put in a request for a Mk I or III but before the trusty DS671 was finally moved on, one trial was completed where 104 bombs were dropped using G-H and 50 per cent of them landed within 310 yards of the target. DS671 saw out its days with the Air Torpedo Development Unit (ATDU) at Gosport and was not SOC until October 13, 1945.

Operational finale

408 Squadron began reverting to the Halifax from July 1944 and by the following month had fully re-equipped. Mk I and Mk IIIs began to arrive at Waterbeach for 514 Squadron from June onwards but it was not until late September that the unit fully relinquished its Mk IIs. It was with 514 Squadron that the last Mk II operation was flown, when DS842 and LL666 joined a 549-strong force to attack Neuss on September 23/24, 1944.

All serviceable Mk IIs were despatched to the HCUs, but their use was limited to flight experience rather than conversion training and by VE-Day just 16 examples remained on strength with the RAF and only ten of them were airworthy.

BELOW: 514 Squadron was the only unit to form with the Mk II at Foulsham on September 1, 1943. At least four of the squadrons Mk IIs are parked line abreast on an inactive runway at Waterbeach, in January 1944, despite the risk of intruder attacks. G A HENRY VIA AUTHOR

DATAPOINT *Despite the frontal area of the engines, the Mk II had a better ditching record than the equivalent Halifax or Merlin-powered Lancaster.*

ABOVE: The hardest working and most extensively used of all the Mk II trials and test-bed machines was LL735, pictured here with a Metrovick F2/4 jet in the rear fuselage. AUTHOR'S COLLECTION

Beyond the call of duty

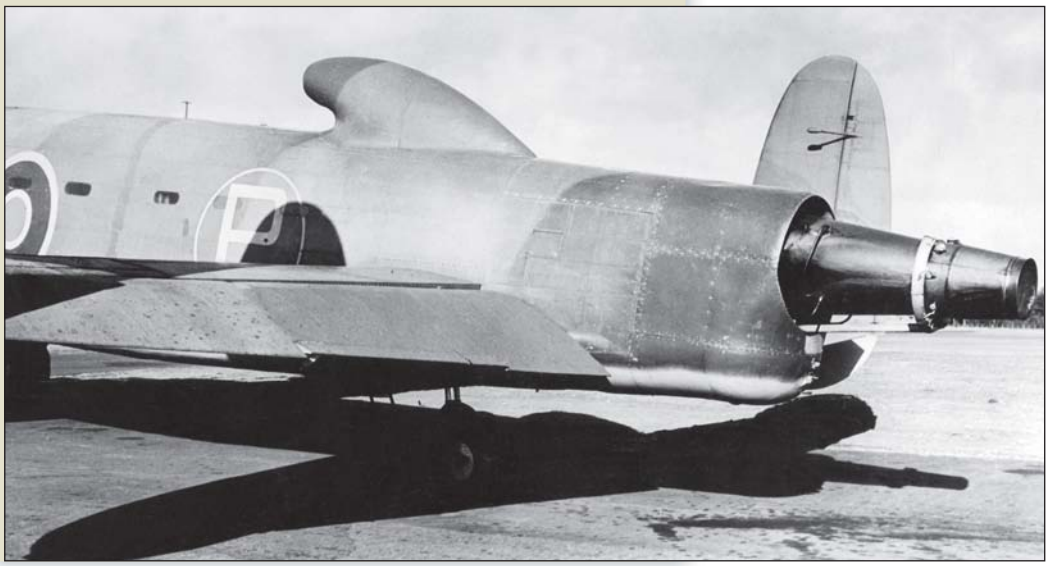
Five Lancaster Mk IIs were involved in flight testing, test-bed or experimental work from the prototype, with its novel engine fitment in 1941, through to post-war work with jet engines and Brabazon components

The first of our group of elite Mk II test-beds is the prototype DT810, qualifying for this position as the Lancaster was obviously not designed to be powered by radial engines. The aircraft was put through extensive trials by Avro and it was not until spring of 1942 that the bomber was transferred to the A&AEE at Boscombe Down for further trials. The aircraft was then allocated to the RAE at Farnborough, where it was employed for fuel system tests using high-pressure vapour fuel. One of DT810's final uses was to carry out an exhaust flame-damping trial before it was SOC in 1944.

The first Mk II to be specifically allocated purely for trials and development duties was the sixth production aircraft, DS606. Delivered to the A&AEE in November 1942, DS606 was then allocated to the Torpedo Development Unit (TDU) located at Gosport, Hampshire. The aircraft was transferred to 4 SoTT (School of Technical Training) at St Athan in November 1945 and was allocated the instructional airframe number 3995M.

A pair of Lancaster Mk IIs were allocated to the Airborne Forces Experimental Establishment (AFEE) operating from Sherburn-in-Elmet and later Beaulieu. The first, LL635, was transferred to 514 Squadron and later SOC following flak damage over Vincly but was replaced by DS819 which only served with the AFEE. This aircraft was involved in a number of trials including experimental work as a Hamilcar and Horsa glider tug and finally as an experimental troop transport. DS819's career with the AFEE came to an end on June 29,

BELOW: A close up of the Metrovick F2/1 in the rear fuselage of LL735. AUTHOR'S COLLECTION



4 *The average production rate of the Mk II by Armstrong Whitworth was just over four aircraft per week.*

ABOVE: LL735 after coming to grief on soft ground; the aircraft was the only Mk II to have its front turret removed and faired over.
AUTHOR'S COLLECTION

1945 when the bomber undershot the approach to Husum and was written off.

DS708 was another long-serving Mk II which served with 426 Sqn until April 1944 and then with 408 Squadron (as EQ-A and EQ-Q) before being allocated to Short Brothers at Rochester in February 1945. The aircraft then found itself with the RAE at Farnborough where it was used to conduct trials with servo spring tab controls and a variety of modified elevators and rudders; the former would later be installed in the Bristol Brabazon airliner. The aircraft came to an undignified end as a target at the Proof and Experimental Establishment (PEE), Foulness in 1950.

The TFU and the NGTE

The Telecommunications Flying Unit (TFU), a section of the Telecommunications Research Establishment (TRE) based at Defford, operated a pair of late production Mk IIs between December 1944 and 1948. The first of these was LL736, which was installed and later trialled with a new type of experimental radar gun laying equipment, designated AGLT Mk III. The device, designed by Dr Philip Dee and Dr Alan Hodgkin, had entered service with 101 Squadron in September 1944 and was intended to fit in the Lancaster's FN.121 rear turret. The Mk III differed from earlier models by being able to scan independently, regardless of the position of the turret.

Once this trial was completed, LL736 languished for some time at Defford, but was brought back up to airworthy status in May 1948 when its services were called upon to trial some new radar bombing equipment. The equipment was designed for a new jet bomber under Air Ministry Specification B.3/45, which would evolve into the English Electric Canberra. Installation took some time and once LL736 was ready for the trial, the goal posts had moved and the Canberra was redesigned to Specification B.5/47, which did not require radar bombing equipment. The TFU had no further use for LL736 and after being dispatched to an RAF MU, the aircraft was SOC on June 27, 1950.

The second TFU machine was LL737 of which very little is known other than it may have been involved in the flight testing of remotely-controlled turrets. Later credited with serving with the RAE, the aircraft was SOC on January 13, 1947.

Lancaster Mk II test-bed LL735 was destined to be the longest and last example of the breed. The aircraft was allocated to Farnborough in 1943 in connection with a joint RAE and Metropolitan-Vickers Electrical Company Limited project to produce an axial-flow jet engine. The engine was the Metrovick F2/1 which was installed into the rear fuselage of the aircraft which deleted the rear turret position. With this unit installed, the aircraft was designated as an experimental aircraft; it was guarded at all times and re-serialled as LL735/G. The aircraft later came under the charge of Frank Whittle's Power Jets Limited, with the company taken over by the state-owned Power Jets (Research & Development) in 1944. By this stage LL735/G was installed with the improved F2/4 engine in the rear fuselage. The Lancaster was also allocated to the NGTE (National Gas Turbine Establishment), Metropolitan-Vickers and Armstrong Whitworth at Bitteswell for a variety of trials including the testing of different fuels. The very last Lancaster Mk II to fly was struck off charge on March 31, 1950.

Avro 683 Lancaster Mk II

MANUFACTURER
A.V Roe and Company Limited

TYPE
Four-engined heavy bomber

POWERPLANT
Four 1,675hp Bristol Hercules VI or XVI 14-cylinder air cooled sleeve-valve radial engines

DIMENSIONS

Span:	102ft
Length:	69ft 4in
Height:	20ft 6in
Wing Area:	1,297sq/ft
Dihedral:	7°
Incidence:	4°
Wing loading:	46.26 lb/sq ft
Span loading:	5.77 lb/sq ft

WEIGHTS

Structure:	17,064lb
Powerplants:	12,335lb
Fuel & oil tanks	1,796lb
Empty:	31,195lb
Fixed military load:	4,120lb
Gross:	63,000lb

PERFORMANCE

Max Speed:	265mph at 14,000ft with a full bomb load
Cruising speed:	167mph at 15,000ft
Rate of climb:	15,000ft in 20mins & 20,000ft in 26mins
Ceiling:	18,500ft (21,000ft during A&AEE trials)
Max still air range:	2,370 miles at 15,000ft
Take-off run:	1,350yds with a full load

MAIN EQUIPMENT
Automatic Mk II or Mk XIV bomb sight; F.24 camera; TR9F and T1154/R115 transmitter/receiver; D.R. Mk I compass; Type J Mk III emergency dinghy and 'Gee' Mk I or Mk III.

ARMAMENT
Two .303in Browning machine-guns in a Nash & Thompson FN.5A nose turret, two .303in Brownings (1,000 rpg) in a Nash & Thompson FN.50 dorsal turret (1,000 rpg), four .303in Brownings (2,500 rpg) in a Nash & Thompson FN.20 or FN.120 rear turret and two .303in Brownings (500 rpg) in a Nash & Thompson FN.64 ventral turret. Some aircraft were fitted with a single .50in Browning machine gun in the fuselage floor in place of the FN.64 during early 1944. Up to 14,000lb in bombs in various combinations and provision, in some aircraft, bulged and extended bomb bay doors allowed the carriage of a single 8,000lb bomb.

PRODUCTION
One prototype Lancaster Mk II, DT810 followed by 300 production Mk IIs all built by Armstrong Whitworth at Whitley between September 1942 and March 1944 in the serial ranges DS601-DS635, DS647-DS692, DS704-DS741, DS757-DS797, DS813-DS852, LL617-LL653, LL666-LL704 and LL716-LL739.